NEWS SCIENCE NEWS

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"You are hereby notified that your application as above identified has been found to contain subject matter, the unauthorized disclosure of which might be detrimental to the national security, and you are ordered in nowise to publish or disclose the invention or any material information with respect thereto, including hitherto unpublished details of the subject matter of said application, in any way to any person not cognizant of the invention prior to the date of the order, including any employee of the principals, but to keep the same secret except by written consent first obtained of the Commissioner of Patents, under the penalties of 35 U.S.C. (1952) 182, 186.

"Any other application already filed or hereafter filed which contains any significant part of the subject matter of the above identified application falls within the scope of this order. If such other application does not stand under a security order, it and the common subject matter should be brought to the attention of the Security Group, Licensing and Review, Patent Office.

"If, prior to the issuance of the secrecy order, any significant part of the subject matter has been revealed to any person, the principals shall promptly inform such person of the secrecy order and the penalties for improper disclosure. However, if such part of the subject matter was disclosed to any person in a foreign country or foreign national in the US, the principals shall not inform such person of the secrecy order, but instead shall promptly furnish to the Commissioner of Patents the following information to the extent not already furnished: date of disclosure; name and address of the disclosee; identification of such part; and any authorization by a US government agency to export such part. If the subject matter is included in any foreign patent application, or patent, this should be identified. The principals shall comply with any related instructions of the Commissioner.

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(Source: Quoted in "Insights into the Proprietary Syndrome", by Ken MacNeill, in Proceedings of The Second International Symposium on Non-Conventional Energy Technology, 1983, pp. 125-6; see Internet web site, www.padrak.com/ine/)

THE VARIABLE SPEED OF LIGHT

by W. H. & G. D. Owen ©1996

Michelson-Morley experiments, as well as phenomena relating to cyclotron experiments, are said to confirm the special theory's concept of light-speed constancy.

However, the following material shows that the speed of light in the Earth's quasi-inertial reference frame varies with the rate of travel of its source.

This presentation makes no attempt to challenge special theory.

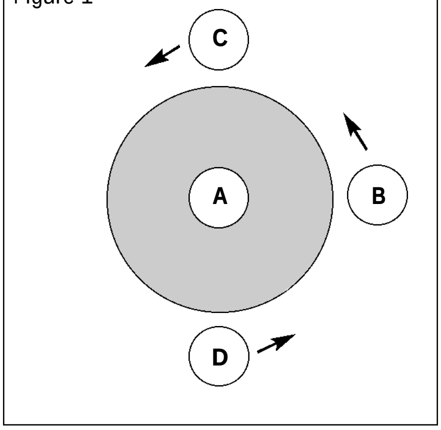
In the fourth chapter of special theory, Einstein suggested that a clock at the equator would incur time dilation compared to a clock at the north pole.

In 1971 Hafele and Keating tested this concept by taking atomic clocks around the world in the same direction as the Earth's axial spin. When the clocks were returned to the laboratory in Washington it was determined that, compared with the laboratory clocks, those clocks had incurred time dilation.

The clocks were then taken in the opposite direction and, as expected, were found to have incurred a lesser amount of time dilation than the laboratory clocks (i.e., they incurred time contraction).

In Figure 1, we are looking at the Earth from a point well above the north pole.

Figure 1



Clock A is at the north pole (more correctly, at the centre of the Earth). Clock B is the laboratory clock (now at the equator) which is spinning around A at close to 1,600 kilometres per hour.

Clock C represents the clock in the first section of the Hafele-Keating experiment, and is moving around A at 2,100 kph. Clock D represents the second part of that experiment, spinning around A at 1,100 kph.

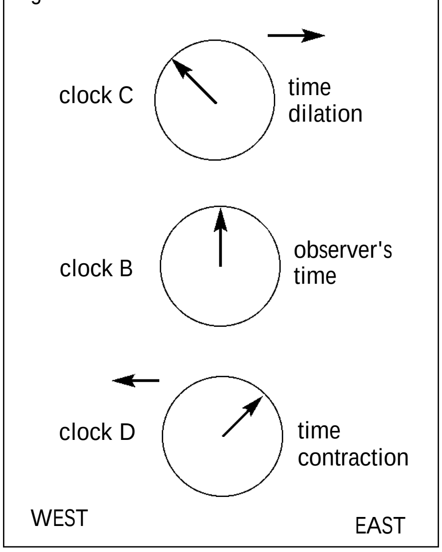


Figure 2

Clock D is incurring time dilation relative to A, clock B is incurring a greater amount of time dilation than D, and clock C is incurring a greater amount of time dilation than B.

Although the results of the Hafele-Keating experiment (i.e., determining elapsed time) were obtained when the clocks returned to the laboratory, those clocks would have been incurring time variations as they moved around the planet. If a person were to be looking at those clocks, as per Figure 1, they would (purely hypothetically) see the clocks ticking over at different rates.

If an observer is located at the equator with his own set of atomic clocks B, then, as clocks C and D move past him, he would determine continuous time variations in those clocks compared to his clock with each of their trips around the planet (Figure 2).

Special theory's time dilation is depicted in physics textbooks using a device known as a light-clock.

Imagine a glass tube, 150,000 kilometres tall. From the point of view of a person standing next to the device, a beam of light travels from the base to a mirror at the top of the tube and back to the base. This determines one second of elapsed time in his reference frame (Figure 3).

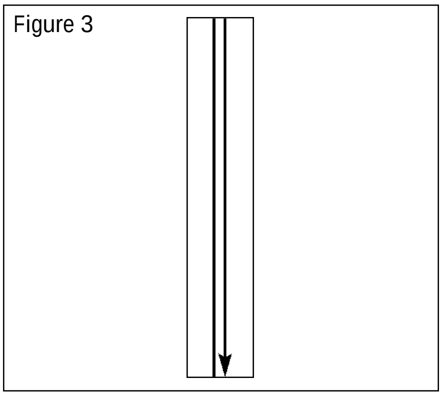
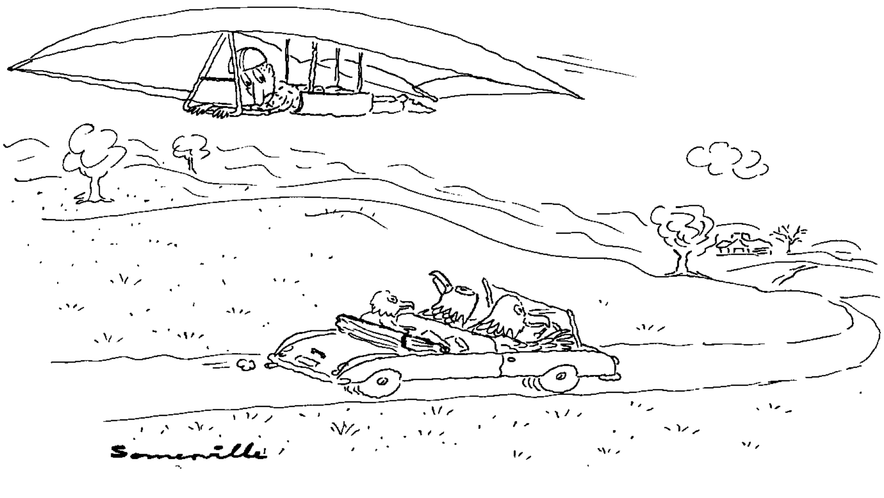


Figure 3



From this person's point of view, the beam travels a distance of 300,000 kilometres in his reference frame. However, from the point of view of a person past whom the device is moving, the beam will take more than one second of his time to travel this longer path (Figure 4).

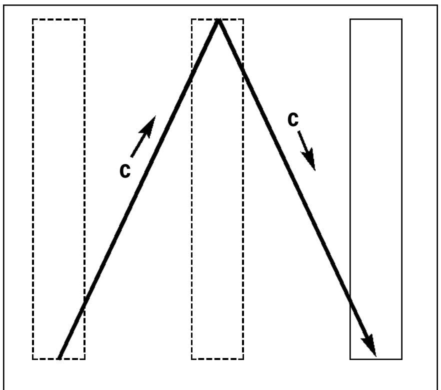


Figure 4

This is based on the assumption that the beam of light will follow the angular path at c (i.e., the special theory claim that the speed of light in the stationary observer's reference frame remains constant, regardless of the rate of travel of its source).

Now let's look at our observer who is located at the equator. We are looking down at this event and there are two light-clocks, mounted horizontally on railway tracks, travelling past the observer and around the planet at identical speeds.

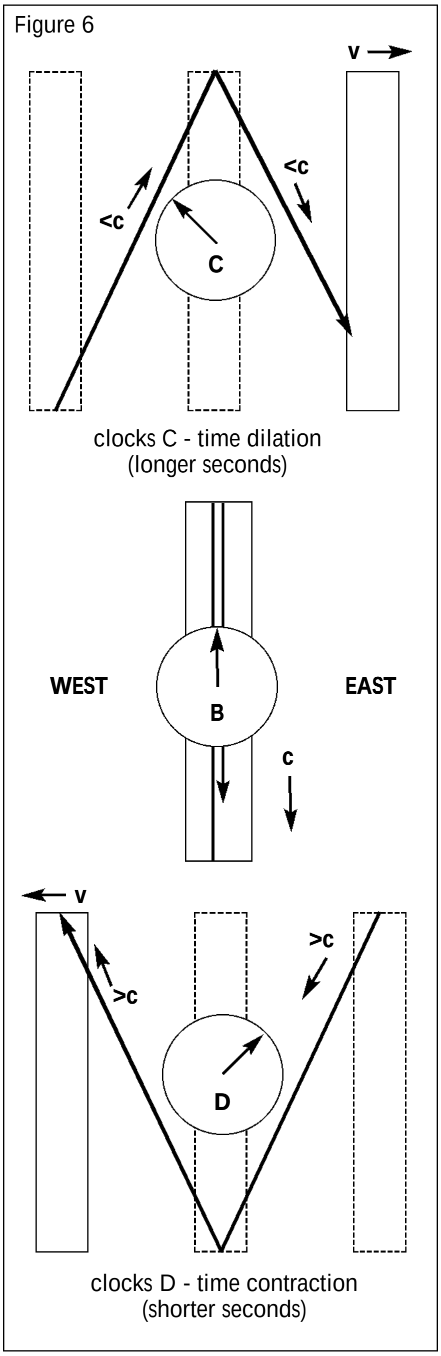
On the assumption of the constancy of light-speed, the beams in those light-clocks should move in this fashion relative to the observer (Figure 5).

The light-clocks are travelling at the same speeds past the observer, and both beams should travel the same distance in a given time, determined by the observer's clock.

It is a basic tenet of physics that a light-clock and an atomic clock located in the same reference frame will remain synchronous. On that basis, the event depicted in the previous diagram will not take place as shown.

Our earlier diagram showed atomic clocks moving past an observer located at the equator. We now add the above-depicted light-clocks to that picture and supply the observer with his own light-clock (Figure 6).

In accordance with the results of the Hafele-Keating experiment and the fourth chapter of special theory, atomic clock C (actually, a set of atomic clocks) will incur



time dilation relative to atomic clocks(s) B; and in accordance with the tenet that light-clocks and atomic clocks that are stationary relative to each other will remain synchronous, it follows that light-clock C will tick over at a slower rate than light-clock B.

Therefore, the beam in light-clock C will travel a shorter distance than the beam in light-clock B in a given time as determined by the observer.

In accordance with the results of the Hafele-Keating experiment and the fourth chapter of special theory, atomic clocks(s) D will incur time contraction relative to atomic clock(s) B; and on the basis that light-clocks and atomic clocks that are stationary relative to each other will remain synchronous, it follows that light-clock D will tick over at a faster rate than light-clock B.

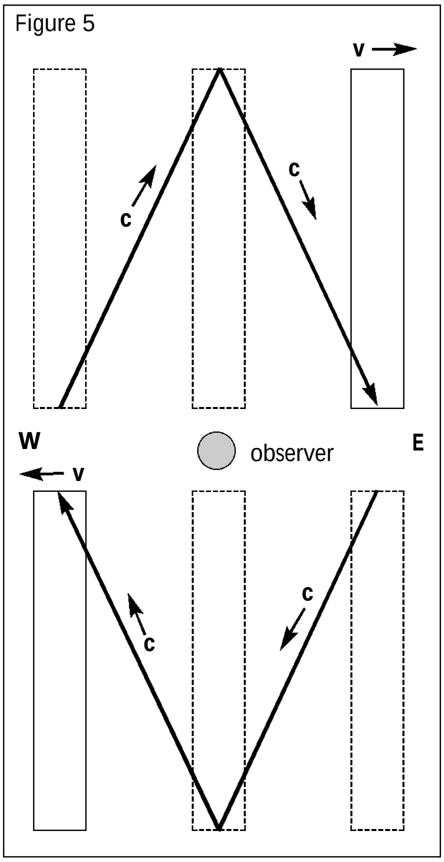
Therefore, the beam in light-clock D will travel a longer distance relative to the observer than the beam in light-clock B in a given time as determined by the observer.

In conclusion, the beam of light in light-clock C travels a shorter distance in a given period of time as determined by the observer than the beam in light-clock B, and the beam in light-clock D travels a longer distance than the beam in light-clock B in that same period of time.

On the basis that beams B, C and D travel different distances in a given period of time as determined by the observer, then the speed of light as represented by those beams is not constant relative to that observer.

Although this experiment is not conducted in a special-theory inertial reference frame, it is conducted in the same reference frame as Michelson-Morley experiments and particle-acceleration experiments.

Contrary to interpretations of those experiments, according to the results of the Hafele-Keating experiment and the tenet that an atomic clock and a light-clock that are contained in the same reference frame will remain synchronous, the speed of light in the Earth's quasi-inertial reference frame is not constant. This does not invalidate Einstein's special theory of relativity. ∞



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